

04-30-07

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April 26, 2007

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METHOD FOR CORRECTING THE EFFECTS OF INTERDETECTOR BAND BROADENING

Application No.: 10/665,903
Inventor: Steven P. Trainoff
Title: Method for correcting the effects of interdetector band broadening
Date of filing: September 18, 2003
Assignee: Wyatt Technology Corporation
P. O. Box 3003
Santa Barbara, CA 93130-3003
Registered Agent: Philip J. Wyatt, Reg. No. 32,449
Attorney Docket No.: WTC 0303
Examiner: Juan Carlos Ochoa
Group Art Unit: 2123

Applicant acknowledges Examiner Ochoa's communication of October 31, 2006.

Telephone interview

A brief telephone interview with the Examiner occurred on April 12, 2007. Its purpose was to clarify some elements of the application preparatory to the instant response. Applicant respectfully thanks Examiner Ochoa for his patience and clarifications.

Information Disclosure Statement

The Examiner is correct in that a typographical error occurred on the Information Disclosure Statement submitted August 24, 2006. The reference should read EP-0665433. A new Information Disclosure Statement is submitted herewith.

Application No.: 10/665,903



PTO/SB/17 (07-06)

Approved for use through 01/31/2007. OMB 0651-0032

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

FEE TRANSMITTAL

For FY 2005

☒ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$) 690.00

Complete if Known

Application Number	10/665,903
Filing Date	September 18, 2003
First Named Inventor	Steven P. Trainoff
Examiner Name	Juan Carlos Ochoa
Art Unit	2123
Attorney Docket No.	WTC0303

METHOD OF PAYMENT (check all that apply)☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____☒ Deposit Account Deposit Account Number: 23-3435 Deposit Account Name: _____

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

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Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee (\$)	Small Entity Fee (\$)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180
Total Claims	Extra Claims	Fee (\$)
- 20 or HP = _____ x _____ = _____		
HP = highest number of total claims paid for, if greater than 20.		
Indep. Claims	Extra Claims	Fee (\$)
- 3 or HP = _____ x _____ = _____		
HP = highest number of independent claims paid for, if greater than 3.		

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee (\$)	Fee Paid (\$)
- 100 = _____ / 50 = _____ (round up to a whole number) x _____ = _____				

4. OTHER FEE(S)

Non-English Specification, \$130 fee (no small entity discount)

Other (e.g., late filing surcharge): Submission of an IDS - Fee 1806; Late filing Surcharge - Fee 2253 690.00**SUBMITTED BY**

Signature	<u>Philip J. Wyatt</u>	Registration No. (Attorney/Agent) 32,449	Telephone 805-681-9009 x 200
Name (Print/Type)	Philip J. Wyatt		Date April 26, 2007

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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05/01/2007 AWONDAF1 00000034 233435 10665983

01 FC:1896 100.00 DA
02 FC:2253 510.00 DA

Abstract

The Examiner's objection to the length of the abstract is duly noted and a replacement abstract is included herewith.

Typographical errors in the Specification

The objections based on typographical errors noted by the Examiner have been corrected on the enclosed replacement paragraphs. In addition, an application cited in the specification has since issued and the updated information is included in a replacement paragraph also enclosed herewith.

New Drawing

Per the Examiner's request for a drawing to understand better the invention, Applicant submits herewith a new drawing graphically clarifying the invention, thereby. This drawing and associated amendment to the specification discussed below introduce no new matter. All of the illustrated elements are fully disclosed in the original specification

Amendment to the Specification

An amendment to the Specification has been added, following 37 CFR 1.121(b), for purposes of elucidating the newly added Fig. 8. The new drawing and specification amendment introduce no new material and have been added strictly to present the algorithm disclosed for the benefit of those who may not be skilled in all of the mathematical arts utilized in the present application.

Claims

All pending claims, 1-10 and 18 are cancelled and new claims 19-30 are submitted herewith. Claims 11 through 17 are previously withdrawn. The Examiner's objections have been duly noted and addressed in drafting these new claims.

Prior art discussion

On page 5, point 26, Examiner Ochoa points out that

"Shortt ...discloses a method to determine the best fit parameters in a chromatographic separation containing a separation device followed by two or more detectors (see col. 2, lines 15-20) comprising the steps of: a) Selecting a broadening model containing a set of adjustable parameters..."

Shortt does not consider the issue of effect of interdetector band broadening. Instead he *implicitly* assumes that the sample undergoes no mixing or dilution so that the concentration of the sample passing through the light scattering detector is *identical* to that subsequently measured by a downstream refractive index detector so that the method of Zimm can be applied to extract molecular parameters (molar mass and mean squared radius). The only correction applied is for the interdetector volume which causes a time delay between when the sample measured by one detector is subsequently measured by a downstream detector. The fit model used by Shortt does not correct for interdetector broadening.

The Examiner then continues with reference to his interpretation of the steps in Shortt's method

"...b) Injecting a sample (see col. 7, lines 57-60); c) Collecting the signals from said detectors corresponding to said monodisperse component (see col. 7, lines 39-43) d) Forming a χ^2 model to be minimized over the peak of said monodisperse component using said collected signal of the most broadened detector signal as a reference against which the said other detector signals are to be broadened (see col 9, lines 32-38). ..."

Again, we must point out the χ^2 model that is used by Shortt is to fit the *light scattering data* as a function of angle, and the concentration data *at a single moment in time (or slice)* to extract the molecular parameters of the sample at that time. The inventive method of the present application is applied to the data in an *entire peak (time interval)* to determine the best fit parameters of a broadening model. The model can then be used to correct the raw data of one detector for the effects of broadening so that the method of Shortt can be applied *subsequently*.

Shortt assumes that the sample measured in any *slice* is monodisperse. The present application assumes that the sample in an entire peak is of uniform composition or is monodisperse. This is a significant distinction because the present application uses the discrepancy between the peak shapes of multiple detectors to determine the best fit parameters of the broadening function. In the method of Shortt, the variation of the peak shapes between different detectors is attributed to a change in the underlying molecular parameters, and not, as in the present application, as due to the corrupting effects of interdetector band broadening.

Examiner Ochoa discusses Janik in his remark

"...Janik discloses determining the best-fit parameters of a broadening model to be used to correct for the effects of band broadening (see col. 3, lines 55-59) and injecting a sample containing a monodisperse component (see col. 5, lines 18-23)..."

It is true that Janik discloses injecting a sample that will produce a monodisperse component. He also presents a method of characterizing the corrupting effect of band broadening so that he can use it as a metric for measuring the efficacy of various hardware modifications aimed at reducing interdetector band broadening. Moreover, Janik only deals with broadening which occurs as the sample enters an optical flow cell. There are irreducible sources of broadening due to the mixing effect of Poisselle flow in the tubing conveying the sample from one instrument to the next. Janik simply characterizes the extent of the broadening, but provides no guidance as to mathematical methods of *correcting* for residual effects of interdetector band broadening after all such hardware modifications have been applied.

Similarly on Page 9, in the explanation of why Claim 4 would be allowed if rewritten, Examiner Ochoa writes

"Janik discloses determining the best-fit parameters of a broadening model to be used to correct for the effect of band broadening (see col. 3, lines 55-59)..."

We do not understand this reference as Janik does not address a method of determining best fit parameters.

We agree with Examiner Ochoa's comment 49 that the previous work of Trainoff of integrating across the peaks is not equivalent to the current method as it reduces the effect of interdetector band broadening to a single multiplicative factor which can be measured by comparing the results of alternate measurement techniques.

Conclusions

Applicant is most appreciative of Examiner Ochoa's extraordinary attention to this application. His comments and insight have been of significant importance to the Applicant in helping him define better, by means of the newly formulated claims and drawing, the inventive elements of the application. Applicant respectfully submits that recommendations of Examiner Ochoa have been duly considered and accepted by means of the actions discussed above. No new matter has been added thereby to the application. With the new claims, expository new drawing and explanation thereof by means of an amendment to the specification, Applicant requests that the application is now in a condition for allowance by the Examiner and transmission thereby for issuance.

WYATT TECHNOLOGY CORPORATION



Philip J. Wyatt

Chief Executive Officer and Agent for the Applicant, Wyatt Technology Corporation

U. S. P. T. O. Registration No. 32,449

Enclosures

Information Disclosure Statement

New Figure

Replacement Abstract

Replacement sheets for changes in the Specification

New Claims